

VARIABLE MAGNIFICATION TRACING PROJECTOR

U.S. Govt. Order #2MP34048

Monthly Progress Report for April 1964

The proposed design revisions were reviewed with the government representative, at Bausch & Lomb, on April 17.

Design

Final design has been completed with the exception of the colling. Final resolution of this problem will be accomplished during the assembly and testing period.

Optics

The optical design and specifications for the condensing system have been completed. Three new condenser lenses are in work and scheduled for completion by May 26. We are attempting to shorten this delivery.

Mech. Parts and Ass'y

The instrument has been disassembled and approximately 70% of the new parts have been completed.

All mechanical parts will be ready for assembly by May 20.

Assembly will begin May 8 and should be completed and ready for testing by May 29.

Based on the present scheduling, the instrument will be ready for customer acceptance inspection by June 16.

## Variable Magnification Tracing Projector

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### Monthly Progress Report

Covering the Period From

Feb. 28, 1964 thru March 31, 1964

The following work was accomplished on the contract in the reporting period.

The mechanical design and details for the two rail vertical support structure were completed. Optical design for the elimination of the illumination under-filling condition evidenced in the breadboard setup and previous optical calculation was continued.

The condenser system has to cover a range of approximately eight inches in the magnification range from four thru twelve inch lenses. A comprehensive ray tracing of various systems disclosed that to properly fill all apertures in the range, a system involving condenser and lens arrangements differing from those described to the customer representative at the A. S. P. Convention on March 18, 1964 in Washington, D. C. was required.

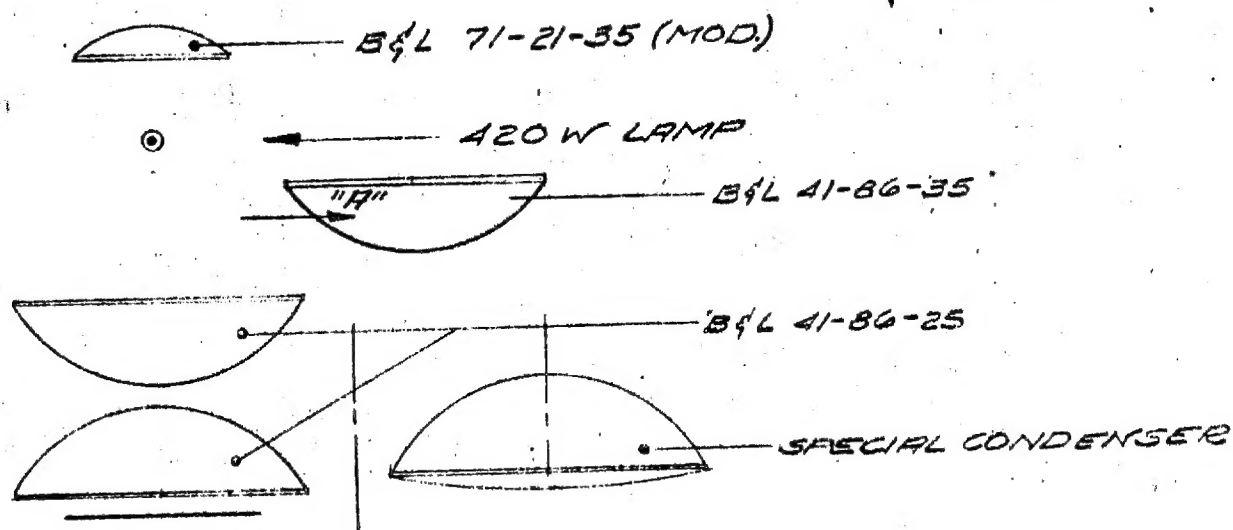
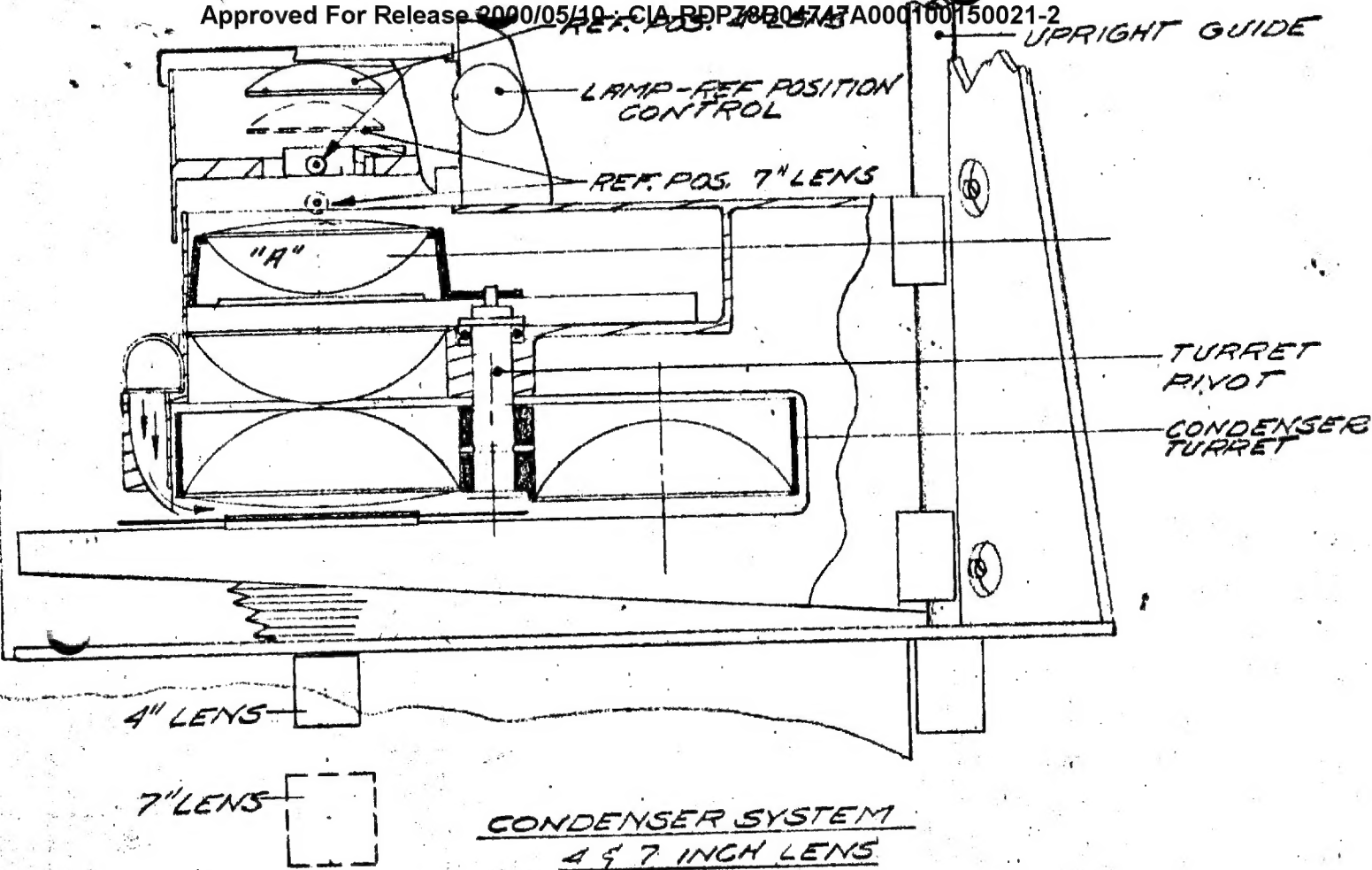
The condenser system for the 105 and 180 mm (4" and 7") lenses remains as previously described and as shown in Figure 1. The adjustment of lamp position will be necessary when changing from the 4 to the 7 inch lens. Note also that the uppermost "A" condenser is in axial position in combination with two lower condensers. For adequate filling of apertures for the magnifications to be covered by the 12" lens the uppermost condenser is to be removed and the lowest condenser exchanged for a condenser contributing less power to the system. Furthermore a 12" lens of larger aperture is required.

A number of stock B&L 12" lenses were tested for resolution distortion and proper filling in the breadboard system from which a 300mm f/4.5 B&L tessar type was selected. This optical system will provide a complete filling of the screen images at all magnification with the prescribed focusing of the lamp and inter changes of condensers as described and illustrated. Mechanical design and detail drawings for the enlarger head and slide have been delayed pending the final specification of the condenser-lamp systems required. With the completion of the optical design mechanical design will proceed.

To date only preliminary investigation into the mechanical design, human factors, and operational considerations of the enlarger head has been possible. The most promising arrangements of components

to comply with the operational functions required, be least obtrusive to the operator, and to be balanced in all condenser positions is shown in figure 1. A rotary condenser turret pivoted centrally aft of the projection axis would carry the two lower condensers. The center condenser is mounted in a fixed position on axis and the upper condenser is a slide such that it will be retracted rearward as the lower turret is rotated 180° to align proper condensers when changing from the 4"-7" lens system to the 12" lens system. To reduce the number of manipulations required by the operator the upper condenser may be linked to the lower turret rotation such that rotation of the turret by the operator shall have retracted or inserted the upper condenser as required. He shall in addition be required to index the lamp position and proper projection lens to complete the changeover.

To insure that the film position shall not have been disturbed during interchanges of the lower condenser, a single glass sandwich platen remains in projection position holding the film in place. Similarly a stream of forced air is being continuously directed across the platens upper surface and rearward away from the operator to maintain suitable gate temperatures. The replacement of the 12" f/16 lens with a 12" f/4.5 will require modification of the existing turret assembly.



CONDENSER SYSTEM  
12 INCH LENS

Fig I  
3-3/-64  
Sol